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# NASA Procedural Requirements

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 (NASA Only)

## **Subject: NASA Radio Frequency (RF) Spectrum Management Manual**

**Responsible Office: Space Operations Mission Directorate**

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## **Chapter 2: NASA Spectrum Management Program Roles and Responsibilities**

### **2.1 Agency-Level Responsibilities**

The AA for SOMD is designated as the NASA Spectrum Manager and is, ultimately, responsible for ensuring compliance with pertinent international and national rules and regulations of all NASA RF spectrum users. Execution of these responsibilities is delegated to the Deputy Associate Administrator (DAA) for Space Communications and Navigation (SCaN). The DAA for SCaN nominates to the Department of State, the Chairperson of the United States Study Group 7 (ITU-R), appoints the NASA IRAC representative, and designates NASA representatives to official spectrum management forums, both national and international. Furthermore, the DAA for SCaN nominates to the Department of State, for consideration by the ITU-R Radiocommunication Assembly (RA), individuals to serve as ITU-R Study Group 7 Chairman and Vice Chairman and authorizes NASA personnel to serve as ITU-R Working Party Chairmen.

The DAA for SCaN has delegated authority for the overall planning, policy, and administration of the NASA Spectrum Management Program to the Director and Deputy Director of Spectrum Policy and Planning within the SCaN. The Director of Spectrum Policy and Planning also chairs and coordinates the Headquarters Spectrum Management Forum (HSMF), which consists of representatives from the NASA Mission Directorates and cross-cutting HQ support offices. The HSMF (see Appendix B) identifies new spectrum requirements needed to fulfill the program requirements of the Mission Directorates, in a timely manner, for initiation of analyses and planning activities to support both certification of existing spectrum allocations and potential need of acquiring new allocations. The Director of Spectrum Policy and Planning is assisted in carrying out delegated responsibilities by the NASA National Spectrum Program Manager and the NASA International Spectrum Program Manager.

The National Spectrum Program Manager shall oversee electromagnetic (EM) spectrum activities involving entities internal to the U.S., including the NTIA, the FCC, and other internal entities involved in the domestic management of the EM spectrum and ensure that all frequency assignments are carefully reviewed to determine if they should fall under the Sensitive But Unclassified Category in accordance with NPR 1600.1 and the desires of the responsible program offices. The National Spectrum Program Manager shall also ensure that the Spectrum Operational Plan, Five-year Plan, and Long-Range Plan are reviewed and updated annually if necessary and assist the NTIA in their Federal Spectrum Strategic Plan effort. The National Spectrum Program Manager shall also identify any programs at risk due to possible lack of spectrum allocation or non-sustainability because of commercial encroachment and other sharing conditions within the allocated bands due to possible electromagnetic interference (EMI) conflicts. The National Spectrum Program Manager shall serve as the focal point for spectrum-related Freedom of Information Act (FOIA) matters.

The International Spectrum Program Manager shall oversee EM spectrum activities involving entities external to the U.S., including the ITU, the Inter-American Telecommunication Commission (CITEL), other non-NASA civilian space agencies (e.g., European Space Agency (ESA), Japan Aerospace Exploration Agency (JAXA) et. al., the Space

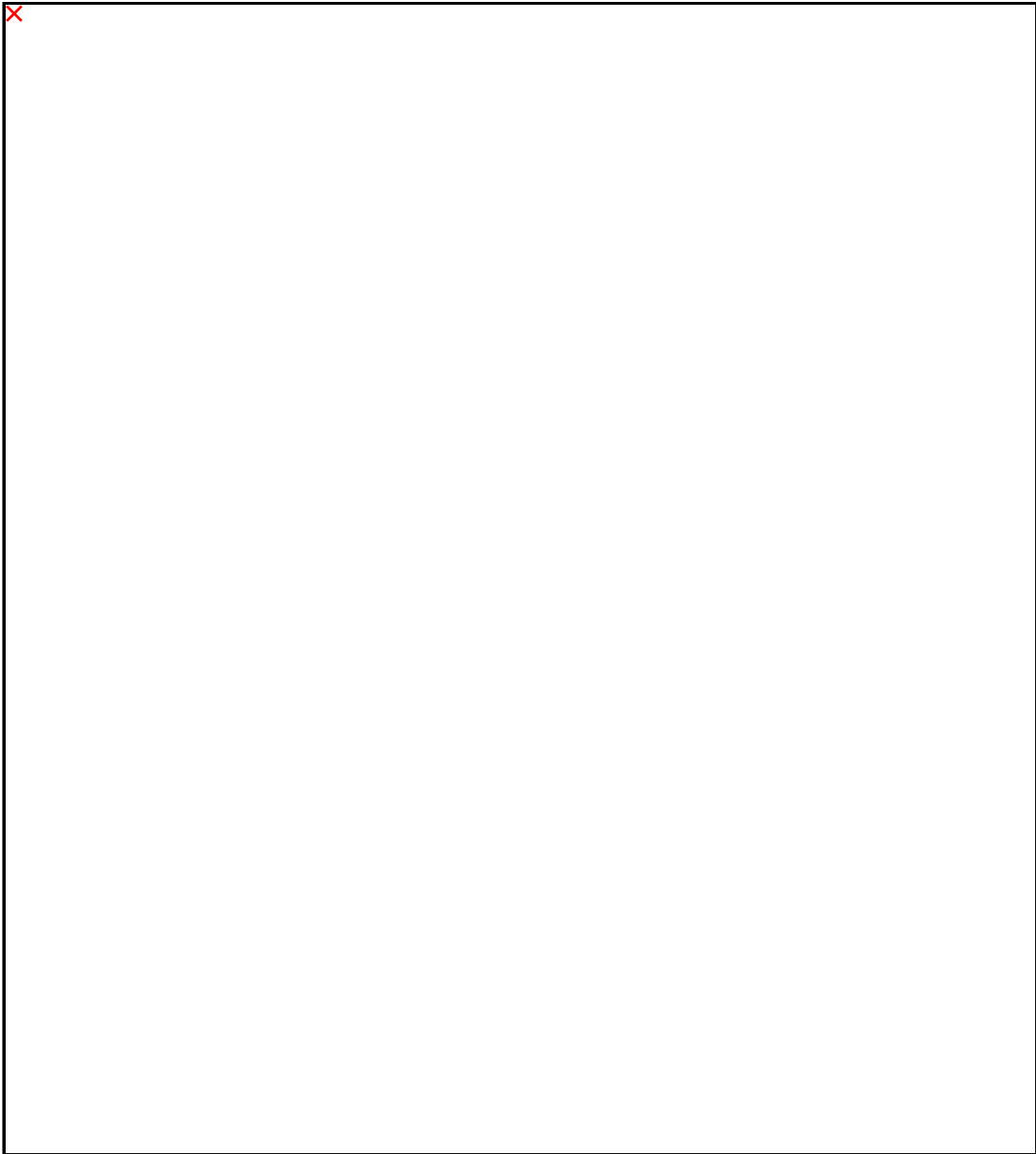
Frequency Coordination Group (SFCG), and other external entities involved in the management of the EM spectrum. The International Spectrum Program Manager shall also coordinate NASA involvement in related NASA and U.S. preparatory activities for World Radiocommunication Conferences and other international spectrum conferences and meetings. Descriptions of the spectrum management structures for the ITU and interfaces between the U.S. national spectrum management structure and the ITU are contained in Appendices C and D.

Specifically, the Director of Spectrum Policy and Planning establishes the policies, and the National and International Spectrum Program Managers implement the necessary procedures to:

- (1) Obtain adequate spectrum to support Agency programs.
- (2) Ensure Agency compliance with national and international rules and regulations.
- (3) Ensure timely processing of spectrum allocations and frequency assignment requests.
- (4) Ensure timely dissemination of technical and regulatory changes to the Center/Facility Spectrum Managers and the JPL Spectrum Manager.
- (5) Provide the means for NASA Mission Program Managers to obtain guidance on spectrum matters so that spectrum-dependent devices are coordinated at the conceptual stage.
- (6) Ensure identification and mitigation of any RFI, which might be caused or suffered by Agency operational programs.
- (7) Provide planning (with coordination of the HQ Mission Directorates) and implementation of actions required to obtain new allocations or enhanced radio regulations through national and international organizations.
- (8) Provide spectrum planning and support to NASA's technology transfer mission.
- (9) Advocate rules and rule changes that support the lowest life-cycle cost technical solutions to NASA programs for meeting their communications needs.

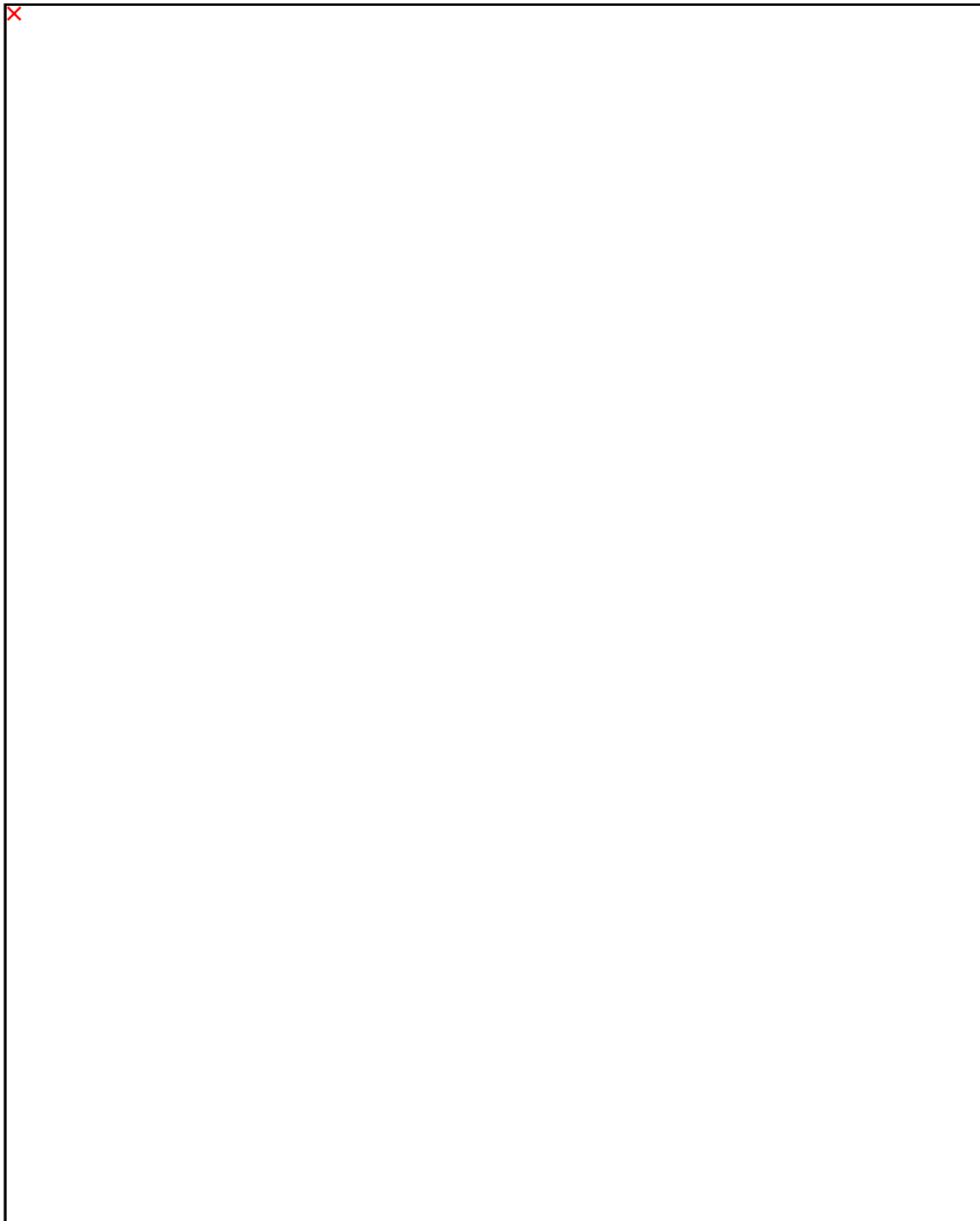
The Director of Spectrum Policy and Planning will provide civil servant staff and necessary contract support for representing the Agency in national and international regulatory fora. Participation in these fora is required to advance and defend Agency spectrum allocation and regulatory needs in addition to securing license operating authority for flight and administrative programs. These fora include, nationally, the NTIA IRAC and its subcommittees, relevant entities established by NASA, the FCC, the NTIA, and the U.S. Department of State to deal with national and international regulatory proceedings, and the ITU and its relevant sectors, study groups, and working parties. The structure of the NASA Spectrum Management Program is shown in Figure 2-1. NASA and its relationship to the national spectrum management structure are presented in Figure 2-2.





**Figure 2-1 NASA Spectrum Management Program**





**Figure 2-2 NASA/National Spectrum Management Structure**

## **2.2 NASA Mission Directorates And Other Headquarters Offices' Responsibilities**

NASA Mission Directorates and other Headquarters Offices shall coordinate spectrum requirements with the Director of Spectrum Policy and Planning. Under the National Aeronautics and Space Act of 1958, as amended, NASA has the responsibility to seek and encourage, to the maximum extent possible, the fullest commercial use of space. To the extent NASA technology programs are involved in supporting the U.S. commercial communications satellite industry and to the extent necessary to ensure adequate spectrum support for these programs, the National Spectrum Program Manager must provide adequate coordination and representation to work with the FCC.

For future Agency missions, each NASA Mission Directorate, through the HSMF, shall provide the latest conceptual spectrum requirements (communications, remote sensing, and any others) and an economic analysis justifying the need for the specific frequency and bandwidth, as required by OMB Circular A-11, to the Director of Spectrum Policy and Planning with respect to programs and future mission. This economic analysis must be completed and approved by the NTIA before funding can be provided.

## 2.3 NASA Centers Responsibilities

Each Center Director is responsible for implementing the Agency spectrum policies and applicable procedures through the publication of Center management instructions and adherence to this NPR and providing resources in support of the Center/Facility spectrum management function. Each Center Director will designate a qualified Center/Facility Spectrum Manager and a qualified alternate Center/Facility Spectrum Manager. The JPL, although not a Center, also provides a qualified JPL Spectrum Manager and a qualified alternate JPL Spectrum Manager.

Each Center/Facility Spectrum Manager and the JPL Spectrum Manager shall participate in their Center procurement process for all RF equipment in order that the above outlined responsibilities may be properly discharged.

Each program/project with radio frequency (RF) requirements at a NASA Center has the following responsibilities:

- Conceptual phase (Phase A)
  - Notify Center Spectrum Manager of RF use concept.
  - Include Center Spectrum Manager in feasibility assessment of systems involving RF.
- Prior to System Requirements Review (SRR) - pre-Phase B
  - Provide RF requirements and concept of operations to Center/Facility Spectrum Manager in support of engineering assessment to determine available frequency bands and in determining the necessity of preparing for a NTIA Stage 1 data package and request for certification.
- Between SRR and Preliminary Design Review (PDR) - Phase B
  - Work with Center/Facility Spectrum Manager to complete the frequency selection process.
- Preliminary Design Review (PDR) - Phase B
  - Provide design details to Center/Facility Spectrum Manager for NTIA Stage 2 data package by at least 60 days prior to PDR.
  - Provide an economic analysis justifying the need for the specific frequency and bandwidth as required by OMB Circular A-11. The economic analysis shall be completed and approved by the NTIA before funding can be provided.
  - Center/Facility Spectrum Manager submits NTIA Stage 2 application no later than 2 months after PDR.
- Critical Design Review (CDR) - Phase C
  - Provide measured/as designed parameter updates to Center/Facility Spectrum Manager for NTIA Stage 4 data package no later than 60 days prior to CDR.
  - Center/Facility Spectrum Manager submits NTIA Stage 4 application no later than 2 months after CDR.
- Prior to system deployment/operation - Phase C
  - NTIA Stage 4 certification and frequency assignment licenses from the NTIA Frequency Assignment Subcommittee (FAS) must be in hand.

Each program/project hosting equipment/experiments/payloads with radio frequency (RF) requirements (NASA providing the platform but do not control/own the RF equipment - transmitters/receivers) at a NASA Center has the following responsibilities:

- Feasibility/Conceptual phase
  - Inform the RF equipment/experiment/payload owner (i.e. customer) that spectrum certification and RF authorization/license to operate the equipment is their responsibility. An approved RF license (experimental or operational, depending on the use and scenarios) is a prerequisite for flight manifest.
  - Notify Center Spectrum Manager of the new RF equipment use concept
  - Request, from customer, a copy of RF license for each RF transmitter and submit to Center Spectrum Manager for review and approval for flight use.
- o Aircraft platforms: no later than 8 weeks prior to 1st flight
- o Space platforms: no later than System Requirements Review (SRR) ? NTIA Spectrum Planning Subcommittee (SPS) process can be 6 months or longer.
- Prior to 1st Flight

- Customer must provide approved RF license(s) to program for final validation by the Center Spectrum Manager.
- Failure to provide approved RF license(s) will result in delay of 1st flight.

All Center/Facility Spectrum Manager, JPL Spectrum Manager, and their alternates shall:

- (1) Coordinate RF spectrum requirements for the site including the licensing of all transmitters (whether for active remote sensing or communications use and whether spaceborne or otherwise) and the registering in the Government Master File (GMF) of all transmitters, receivers, or radiometers (whether for passive sensing or communications use and whether spaceborne or otherwise). Such licensing and registration shall also take place for individual NASA-owned and/or-operated instruments located in or on platforms owned by other U.S. Government agencies or foreign entities.
- (2) Ensure that all RF equipment belonging to other Government agencies, but are operating onboard NASA vehicles operated by the Center/Facility, have received proper authorization to operate (though responsibility for obtaining that authorization is not necessarily the responsibility of the Center/Facility Spectrum Manager).
- (3) Review any non-NASA systems which are identified within domestic or international system filing and coordination processes as potentially causing interference to the Center and provide comments as required.
- (4) Ensure Centers/facilities adhere to NTIA's channel plan for Very High and Ultra High Frequency allotments and NTIA's narrowband requirement.
- (5) Ensure that permanent assignments are renewed or deleted from the GMF at the time of their 5-year review.
- (6) Maintain accurate records of all frequency assignments in use at or by the Center and JPL.
- (7) Maintain the electromagnetic integrity of the site and its flight missions through proper selection of RF equipment frequencies and electromagnetic compatibility (EMC) testing.
- (8) Ensure day-to-day interference-free operations at the site and by its flight missions
- (9) Identify communication and other RF spectrum requirements such as active and passive remote sensing requirements or future missions proposed by the site and report as early as possible to the National Spectrum Program Manager at HQ for inclusion in NASA long-range spectrum forecasts.
- (10) Prepare technical analyses required to support spectrum applications for site projects.
- (11) Participate in local, national, and international spectrum management coordination groups, as appropriate, to provide representation and cognizance of the Center/Facility's project requirements.
- (12) Coordinate the development and maintenance of Center/JPL instructions for spectrum management with the National Spectrum Program Manager to ensure wide program consistency.
- (13) Serve as the representative for the Director of Spectrum Policy and Planning to the NASA programs/projects at their Centers and JPL.
- (14) In consultation with the local Center/Facility Radiation Safety Officer (RSO), ensure that RF and electromagnetic field emissions conform to the latest requirements of ANSI/IEEE C95.1, Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields 3 kHz to 300 GHz and the ICNIRP Electromagnetic Field Standard, 1 Hz to 300 GHz.
- (15) Ensure coordination of RF spectrum requirements with the NASA Center Safety and Mission Assurance Office. All RF spectrum requirements will be coordinated with the Center Occupational Health Office and the Center/Facility RSO. Based on the particular Center mission responsibilities, RF emissions shall be coordinated with other operations such as range safety, flight operations, operation safety, explosive safety, and propellant handlers.
- (16) Represent their Center at the NASA Spectrum Managers Group (NSMG) meeting, which meets at least annually to review issues pertinent to all Centers (see Appendix F).
- (17) Coordinate Freedom of Information Act related matters with the National Spectrum Program Manager to ensure consistency with Agency-level positions.

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